

WILLOW CREEK FEASIBILITY STUDY
CONCEPTUAL DESIGN COST
DESIGN AND CONSTRUCTION DIVISION
AUGUST 1985

Rec. Aug 20/85

FROM J. Campbell, P. Eng.
Head, Geotechnical Branch

OUR FILE REFERENCE

YOUR FILE REFERENCE

TO L. K. Szojka, P. Eng.
Oldman River Basin Planner

DATE 1985 08 20

TELEPHONE 7-6140

SUBJECT Willow Creek Feasibility Studies

As requested, I am hereby forwarding to you a status report updating the conceptual designs and cost estimates for the three dam sites being considered in this study.

A) Site #1 - Claresholm Site

Since our last status report of March 4, 1985, we have received new 2.5 m contour mapping of the reservoir area. As a result, revised storage capacity curves have been developed using this new mapping. These revised storage capacity curves have been attached and the relevant reservoir data has been included in Table #I.

Land access for foundation investigations have not as of yet been obtained and consequently, no additional engineering design of the dam or associated structures has been completed. As a result, the identical dam and structural design data as was included in the last status report has again been included herein in Table #I.

Although the engineering design has not been revised since the last status report, the cost estimate as presented herein in Table #II, has been updated to reflect the most recent revisions to the unit costs.

A plan showing the location of the proposed dam as well as the approximate extent of the reservoir flooding has also been attached.

B) Site #2 - Pine Coulee Site

There has been a considerable amount of engineering design completed for this alternative since our March 4, 1985 status report. The updated design data for the proposed dam, associated structures and reservoir have been included herein in Table III while the revised cost estimate has been included in Table #IV.

Also attached are copies of the detailed cost estimate, revised storage capacity curves, contour plans showing the approximate extent of the reservoir flooding, a general layout plan showing the proposed locations of all the major structures, and detailed plans showing typical cross sections of the dam as well as the associated structures.

C) Site #3 - Lane Creek Site

Due to land access difficulties, there have been no new mapping or foundation investigations performed for this alternative. As a result, no additional engineering design has been undertaken since the Preliminary Planning Study was completed by Klohn Leonoff Consultants on June 4, 1984. Therefore, the same dam and structural design data as well as the cost estimate that was included in the Klohn Leonoff report have again been included herein as Tables #V and #VI.

It is very important to recognize that because of the much more detailed design information available for Site #2, the accuracy of the information presented herein for this site is also more precise than that of the other two sites. Furthermore, even though the information presented for Site #2 is based on a considerable amount of engineering design, the preliminary design of this alternative is still in progress and some modifications will almost certainly have to be made in the future as the preliminary design is finalized.

NW/lm
Att.

John Campbell, P. Eng.

TABLE I

Site #1 - Claresholm Site

Design Data

1) Reservoir

Project Flood	0.5 PMF
FSL	1030 or 3380 ft $\pm$
Storage at FSL	$40 \times 10^6 \text{ m}^3$ or 32,400 ac ft
Reservoir Area at FSL	$4.23 \times 10^6 \text{ m}^2$ or 1,050 acres
Freeboard or Surcharge	2.0 m

2) Embankment Dam

Dam Crest Elevation	1032 m
Crest Length	860 m
Maximum Height	22.5 m
General Side Slopes	
Upstream	6.5:1
Downstream	6.5:1
Volume of Fill	$1.9 \times 10^6 \text{ m}^3$
Upstream Protection	1.5 m of Riprap & Bedding

3) Service Spillway

Width	23.0 m
Length	190.0 m
Gates	3 @ 7.0 x 4.0 m
Top of Gates Elevation	1030 m
Sill of Gates Elevation	1026 m
Design Flow	$550 \text{ m}^3/\text{s}$

TABLE I (cont'd)

4) Emergency Spillway

Crest Width	100 m
Crest Elevation	1030.5 m
Top of Fuse Plug Elevation	1031.5 m
Design Flow	250 m ³ /s

5) Low Level Outlet (Creek Outlet)

Intake Elevation	1011 m
Conduit Size	2.1 x 2.1 m
Gates Type	Sliding
Gates Well	Wet Type

6) Canal Outlet

Intake Elevation	1018 m 3340 ft
Design Flow	2.5 m ³ /s 300 cfs
Intake	Twin Barrel @ 1.8 x 2.1 m
Gates	Sliding
Gates Well	Wet Type

TABLE II

Site #1 - Claresholm Site

Cost Estimate*

Construction Costs

Embankment Dam	\$ 11,500,000
Outlet Works	\$ 2,000,000
Service Spillway	\$ 8,100,000
Emergency Spillway	\$ 500,000
	\$ 22,100,000

Damage Costs

Reservoir Clearing	\$ 200,000
Land Acquisition & Farmsteads	\$ 1,500,000
	\$ 1,700,000

TOTAL COSTS \$ 24,000,000

* All Costs Include 30% Contingency

TABLE 111

Site #2 - Pine Coulee Site

Design Data

1) Reservoir

Project Flood	0.75 PMF
FSL	1052.5 m or 3453 ft ±
Storage at FSL	$50.3 \times 10^6 \text{ m}^3$ or 40,745 ac ft
Reservoir Area at FSL	$6.0 \times 10^6 \text{ m}^2$ or 1480 acres
Freeboard or Surcharge	1.9 m

2) Embankment Dam

Dam Crest Elevation	1054.5 m
Crest Length	450 m
Maximum Height	21.2 m
General Side Slopes	
Upstream	4:1/8:1
Downstream	4:1/8:1
Volume of Fill	985,600 m ³
Upstream Protection	2.0 m of Riprap & Bedding

3) Diversion Weir

Project Flood	0.3 PMF
Width	42.0 m
Drop	9.75 m
Length	47.5 m
Gates Types & Size	Radial Type - 5,000 x 4,000 mm

TABLE III (cont'd)

4) Low Level Outlet

Intake Elevation	1035 m
Conduit Size	1.5 x 2.5 m Upstream 1.5 x 2.13 m Downstream
Gates Type	1.52 x 2.13 m Sluice Gate
Gates Well	Wet Type

5) Diversion Canal

Length	3500 m
Bottom Width	7.0 m
Side Slopes	3:1
Bed Grade	0.00018

6) Reservoir Inlet

Width	7.0 m
Type	Baffle Blocks

7) Causeway

Crest Elevation	1054.5 m
FSL	1052.5 m
Slope Protection	2.0 m of Riprap & Bedding, Upstream & Downstream

TABLE IV

Site #2 - Pine Coulee Site

Cost Estimates*

Construction Costs

Site Services	\$ 1,000,000
Embankment Dam	\$ 7,500,000
Saddle Dyke	\$ 2,500,000
Outlet Works	\$ 1,500,000
Causeways	\$ 5,200,000
Diversion Weir	\$ 3,400,000
Diversion Canal	\$ 2,400,000
Reservoir Inlet	\$ 320,000
Headgates	\$ 250,000
	<u>\$ 24,070,000</u>

Damage Costs

Road Relocation	\$ 700,000
Reservoir & Land	<u>\$ 2,700,000</u>
	\$ 3,400,000

TOTAL COSTS \$ 27,500,000

* All Costs Include 20% Contingency

TABLE V

Site #3 - Lane Creek Site

Design Data

1) Reservoir

Project Flood	0.75 PMF
FSL	1201 m or 3940 ft $\pm$
Storage at FSL	$59.00 \times 10^6 \text{ m}^3$ or 47,800 ac ft
Reservoir Area at FSL	$2.95 \times 10^6 \text{ m}^2$ or 730 acres

2) Embankment Dam (Rockfill Shell with Impervious Core)

Dam Crest Elevation	1204 m
Crest Length	200 m
Maximum Height	46 m

3) Service Spillway

Length	115 m
Design Flow	$1000 \text{ m}^3/\text{s}$

4) Low Level Outlet

Conduit Size	60 m dia. Tunnel
Length	225 m
Capacity	$190 \text{ m}^3/\text{s}$

TABLE VI

Site #3 - Lane Creek Site

Cost Estimate*

Construction Costs

Embankment Dam	\$ 6,050,000
Outlet Works	\$ 9,070,000
Service Spillway	<u>\$ 9,070,000</u>
	\$ 24,190,000

Damage Costs

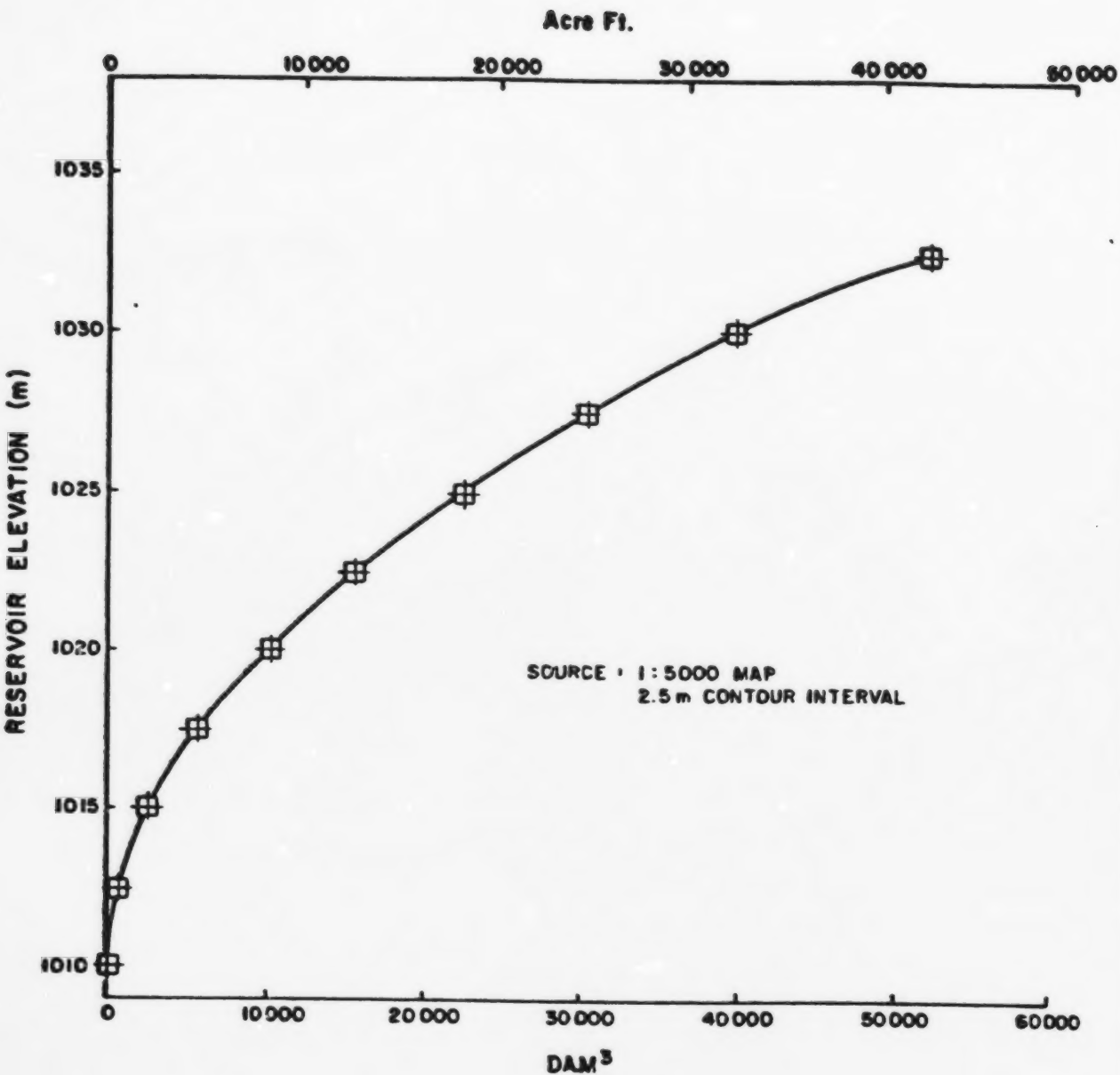
Reservoir Clearing	\$ 130,000
Land Acquisition & Farmsteads	<u>\$ 680,000</u>
	\$ 810,000

TOTAL COSTS \$ 25,000,000

* All Costs Include 40% Contingency

D R A W I N G S

S I T E 01 - C L A R E S H O L M S I T E



SUBMITTED DATE
 DESIGNED
 CHECKED
 DRAWN *E. J. S.*
 APPROVED
 DATE

WILLOW CREEK PROJECT
 CLARESHOLD RESERVOIR - SITE 1

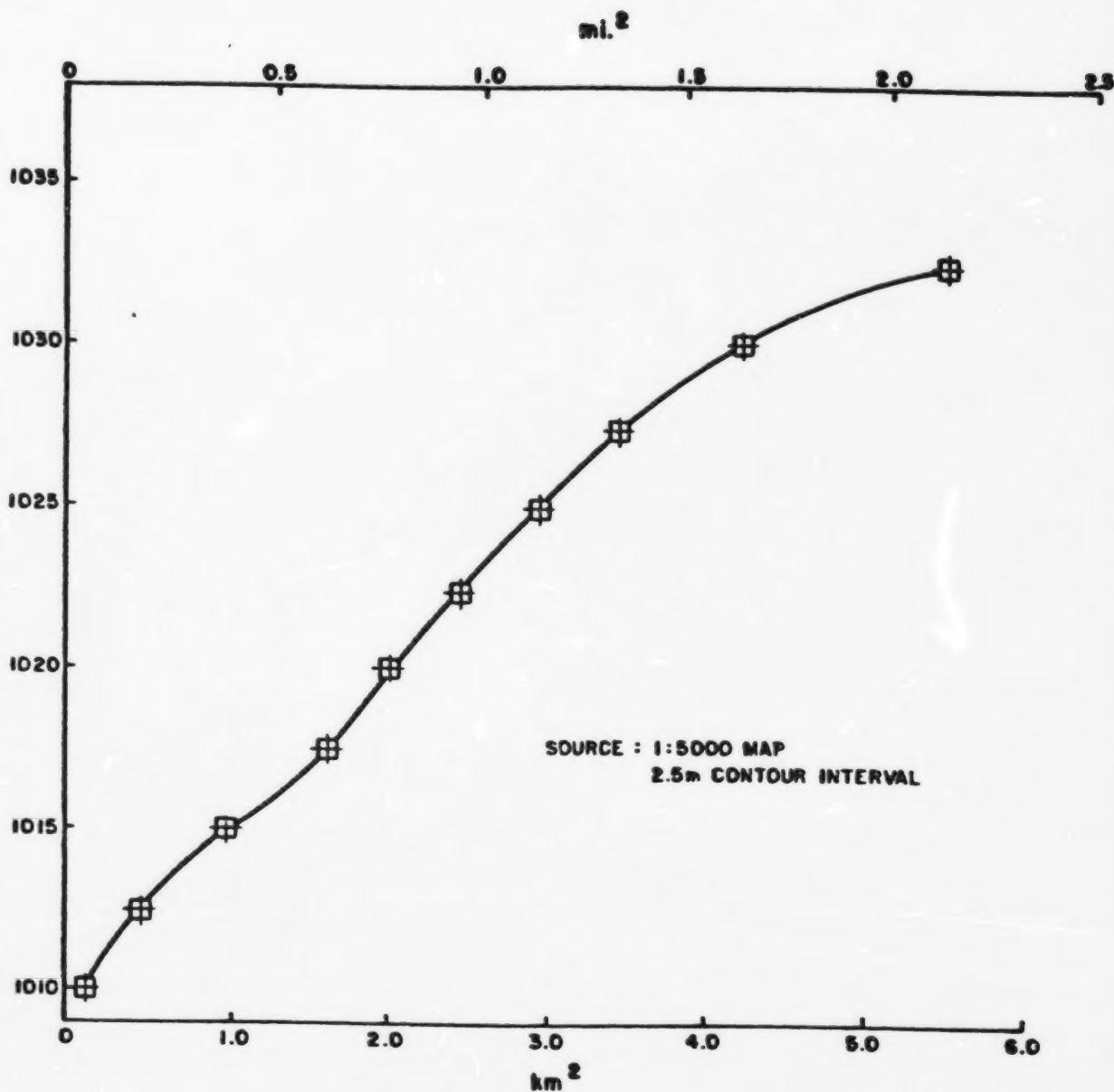
RESERVOIR CAPACITY CURVE

SCALE AS SHOWN
 DATE AUG., 1988
 SHEET 1 OF 1
 DRAWING NO.

DATE

NAME

RESERVOIR ELEVATION (m)



Acera
ENVIRONMENT

WILLOW CREEK PROJECT
CLARENDON RESERVOIR - SITE 1

SUBMITTED
DATE
APPROVED
DATE

DESIGNED
CHECKED
DRAWN
DATE

E. Smith

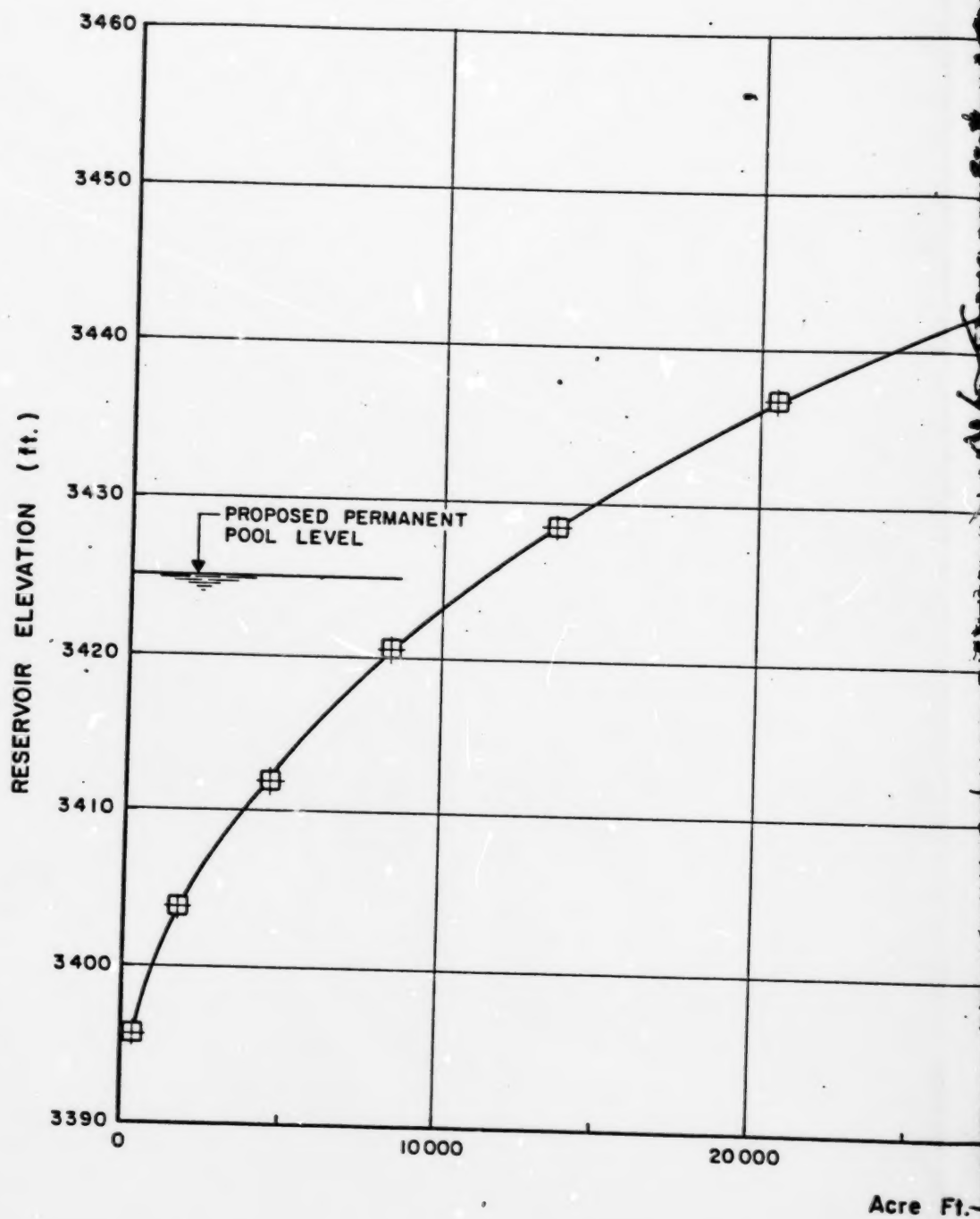
AREA CURVE

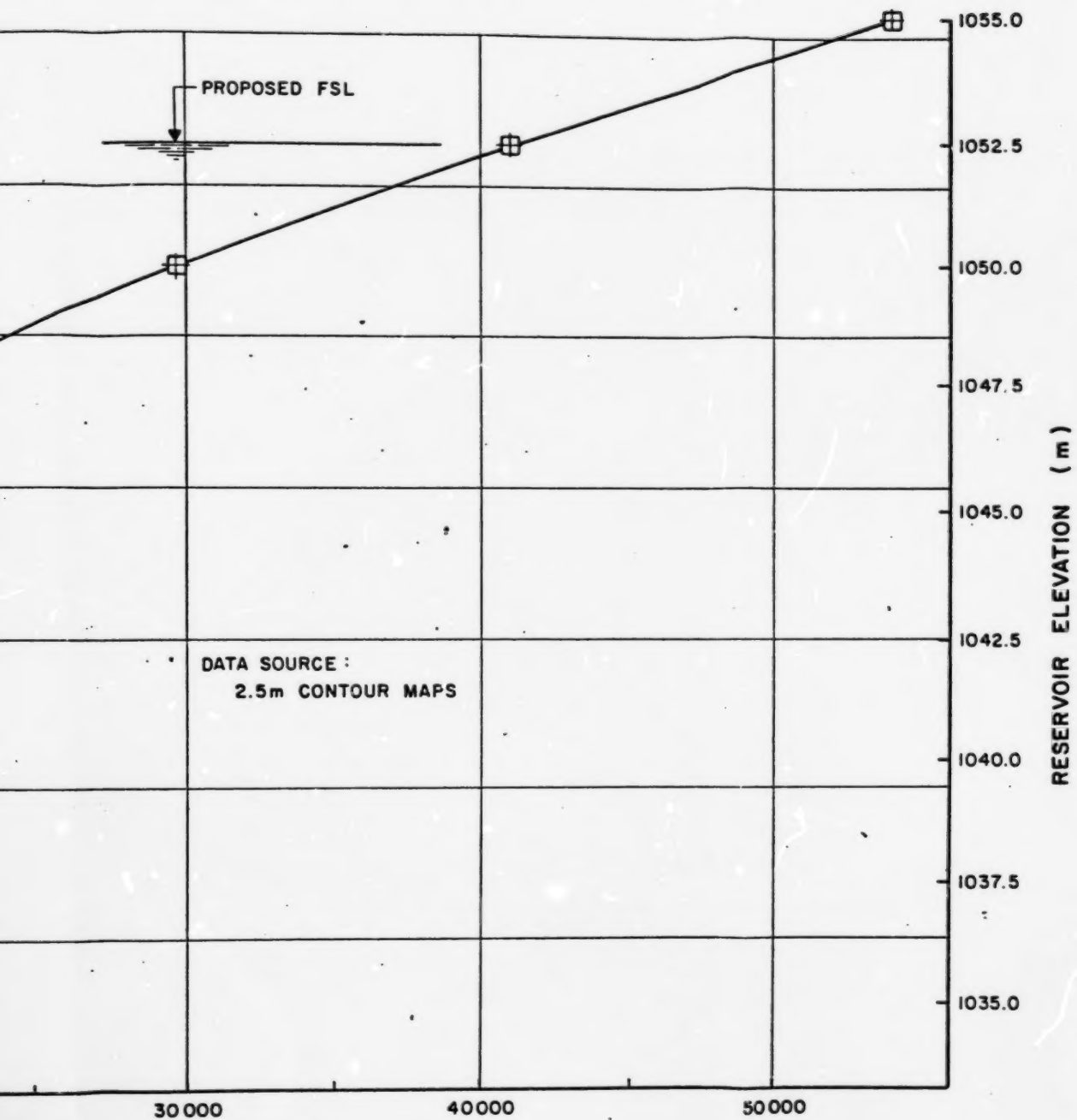
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DATE AUG., 1988

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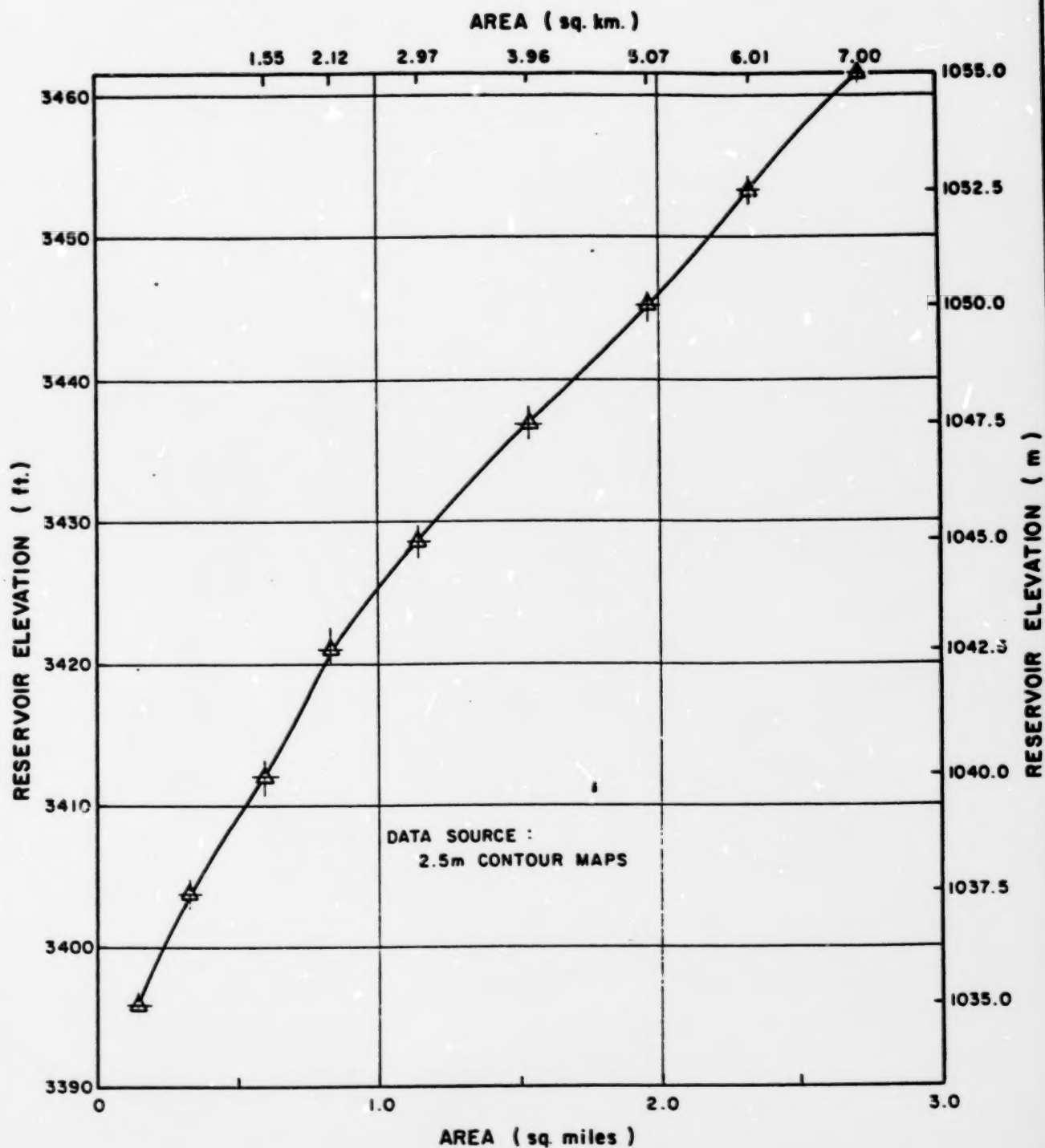
D R A W I N G S

S I T E # 2 - P I N E C O U L E E S I T E





		WILLOW CREEK PROJECT	
		PINE COULEE RESERVOIR	
SUBMITTED		DESIGNED	
DATE		CHECKED	
APPROVED		DRAWN <i>B. Sanders</i>	
DATE		CHECKED	
STORAGE CURVE			
SCALE AS SHOWN		SHEET OF	
DATE AUG., 1988		DRAWING No 3	



Alberta
ENVIRONMENT

WILLOW CREEK PROJECT
PINE COULEE RESERVOIR

AREA CURVE

AS SHOWN
AUG., 1988

B. Sanders